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10/582,578	06/12/2006	Reinhold Wimberger-Friedl	NL031454	1760

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EXAMINER	
SCHIFFMAN, BENJAMIN A	
ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/582,578	WIMBERGER-FRIEDL ET AL.	
	Examiner	Art Unit	
	BENJAMIN SCHIFFMAN	4191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) *8 and 11* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-15 are pending in the instant application.

Claim Objections

2. Claims 8 and 11 is objected to because of the following informalities:

3. Claim 8, contains the word "diglicidylether" which should be "diglycidylether", i.e. the second "i" should be a "y".

4. Claim 11 recites a further limitation of the parent claim 1, specifically the material of the substrate, however claim 1 does not require a substrate "being supported **or not** by a substrate". Therefore claim 11, further limits a limitation from the parent claim that is not required.

5. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 2, 7-10 and 12-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat.

App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949).

9. In the present instance, claim 2 recites the broad recitation "0.1 to 5 times M_{cr}", and the claim also recites "0.5 to 2 times M_{cr}" which is the narrower statement of the range.

10. Claim 7 recites the broad recitation "20-80 vol%", and the claim also recites "40-60 vol%" which is the narrower statement of the range.

11. Claim 8 recites the broad recitation "epoxy resin", and the claim also recites "diglicidylether of bisphenol-A" which is the narrower statement of the limitation

12. Claim 9 recites the broad recitation "group of acrylates and methacrylates", and the claim also recites "ethoxylated bisphenol-A dimethacrylate, hexanedioldiacrylate and polyethylenediacrylate" which is the narrower statement of the range.

13. Claims 12 and 15 recites the broad recitation "thickness of at most 1 mm", and the claim also recites "less than 0.5 mm" which is the narrower statement of the range.

14. Claims 12-15 provides for the use of a blend of thermoplastic polymer, a UV curable resin and a thermally stable photo-initiator, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process

applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

15. For the purpose of compact prosecution the "use" of the blend is construed to be a process in which the blend is molded into the optical microstructure, lens, or microfluidic devices.

Claim Rejections - 35 USC § 101

16. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

17. Claims 12-15 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd.* v. *Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 102

18. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

19. Claims 1-6 and 8-11are rejected under 35 U.S.C. 102(b) as being anticipated by SOANE ET AL (US 6,570,714 B2) as evidenced by DEALY ET AL (Dealy, John M.;

Larson, Ronald G. Structure and Rheology of Molten Polymers - From Structure to Flow Behavior and Back Again. (pp. 152-158, 481-482). Hanser Publishers.)

20. Regarding claim 1, SOANE discloses a process for the fabrication of a composite article, such as an optical microstructure **(see abstract)**, being supported on a substrate **(see column 4 line 40-41)**, starting from a dead polymer, analogous to a thermoplastic polymer **(see column 4 line 54)**, wherein the dead polymer is blended with a reactive plasticizer, analogous to a curable resin, **(see column 4 line 53-54)**, which is curable by UV light **(see column 20 line 47 and column 24 lines 43-44)** and an initiator **(see column 4 line 54)**, specifically thermally stable photoinitiators **(see column 24 lines 44-47)**, to obtain a blend having a lower viscosity than the viscosity of said polymer **(see column 15 lines 4-5)**, said blend being molded and the molded blend being cured by means of UV radiation **(see column 4 lines 55-63 and column 20 line 47)**.

21. Regarding claim 2, SOANE discloses that the dead polymer is polymethylmethacrylate (PMMA) with a molecular weight of 25,000, which is within the claimed range of 0.5 to 2 times the critical entanglement molecular weight, i.e. 14,750 to 59,000, as evidenced by DEALY, where the critical entanglement molecular weight of PMMA is 29,500 **(see page 481)**.

22. Regarding claim 3, SOANE discloses that the dead polymer is substantially fully polymerized, i.e. 95% to 98% polymerized, which is analogous to a minor amount of reactive groups **(see column 13 lines 33-38)**.

23. Regarding claim 4, SOANE discloses that the dead polymer can be amorphous **(see column 21 line 45)**.

24. Regarding claim 5, SOANE discloses that the dead polymer can be a copolymer **(see column 21 line 64)**.

25. Regarding claim 6, SOANE discloses that the dead polymer can be polymethylmethacrylate, polystyrene, polycarbonate **(see column 21 lines 37-41)**, cycloolefinic polymer and cyclo-olefinic copolymer **(see column 23 lines 23-25)**.

26. Regarding claim 8, SOANE discloses that the reactive plasticizer is an epoxy resin **(see column 24 line 30 and 44)**.

27. Regarding claim 9, SOANE discloses that the reactive plasticizer is acrylates or methacrylates **(see column 25 lines 2-21)**, specifically ethoxylated bisphenol A diacrylate **(see column 25 lines 12-13).**

28. Regarding claim 10, SOANE discloses that the dead polymer and the reactive plasticizer have a similar refractive index **(see column 23 line 10-14)**.

29. Regarding claim 11, SOANE discloses that the substrate is polycarbonate, which is a polymer **(see column 17 line 10)**.

Claim Rejections - 35 USC § 103

30. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

31. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

32. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

33. Claims 7, 12 and 14 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over SOANE ET AL (US 6,570,714 B2).

34. Regarding claim 7, SOANE discloses that the concentration of reactive plasticizer is about 0.1-100 wt%, preferably about 1-50 wt%, and more preferably about 15 to 40 wt% **(see column 14 lines 49-54)**, which corresponds to about 0.1 vol% to

about 100 vol%, about 1-1.5 vol% to about 45-60 vol%, or about 13-20 vol% to about 35-50 vol% respectively. This correspondence is based on a conversion using the densities of PMMA reported in KIPP (Plastic Material Data Sheets) of 1.14-1.52 g/cm^3 and the densities of acrylate monomers reported in BRANDRUP ET AL (Polymer Handbook 4th Edition) of 0.8-1.7803 g/cm^3. These materials where chosen as they are an example, specifically example 4, of dead polymers and reactive plastic as disclosed in SOANE **(see column 26 line 66 to column 27 line 9)**. These concentrations overlap, with sufficient specificity to anticipate the claimed range of 20-80 vol%, preferably 40-60 vol% **(see MPEP 2131.03)**, alternatively the claimed range is *prima facie* obvious in view of the overlapping range **(see MPEP 2144.05)**,

35. Additionally it would have been *prima facie* obvious to one of ordinary skill in the art to modify the method of SOANE with higher or lower volume % of reactive plasticizer in order to modify the glass transition temperature or the viscosity of the blend **(see column 15 lines 3-10)** in order to create a more workable blend that would have enhanced flow properties.

36. Regarding claim 12, SOANE discloses a process for the fabrication of a composite article, such as an optical microstructure **(see abstract)**, with a thickness of approximately 0.5 to 1 mm **(see column 10 line 24)** which overlaps the claimed range of at most 1 mm, preferably at most 0.5 mm **(see MPEP 2131.03)**. Additionally SOANE discloses specific examples of thicknesses of 1 mm **(see column 30 lines 2, 59 and column 31 lines 10 and 24)**. These ranges and examples display sufficient specificity to anticipate the claimed range.

37. Alternatively, it would have been *prima facie* obvious to one of ordinary skill in the art to modify the method of SOANE to obtain optical microstructures with a lower thickness, in order to produce optical microstructures that are lighter, and use less raw materials.

38. Regarding claim 14, SOANE discloses a process for the fabrication of a lens **(see abstract)** or optical array **(see column 5 line 43-44)**.

39. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over SOANE ET AL (US 6,570,714 B2) as applied above for claim 12 and further in view of RITZENTHALER ET AL (Influence of epoxy hardener on miscibility of blends of poly(methyl methacrylates) and epoxy networks).

40. SOANE discloses a method of molding an optical microstructure as discussed in the above 102(b)/103(a) rejection of claim 12, particularly with polymethylmethacrylate (PMMA) as the dead polymer **(see column 21 line 38)** blended with various reactive plasticizers, such as UV curable epoxy resin **(see column 24 line 43-44)**.

41. SOANE does not appear to explicitly disclose that the epoxy resin is the diglicidylether of bisphenol-A (DGEBA).

42. However, RITZENTHALER discloses that DGEBA is a common epoxy monomer used for solvating PMMA **(see page 6375 second paragraph)**.

43. At the time of invention, it would have been *prima facie* obvious to one of ordinary skill in the art to modify the method of SOANE to include DGEBA as the epoxy

resin monomer of RITZENTHALER, in order to increase the toughness of the epoxy thermoset with a thermoplastic rich phase or to improve processing techniques for high temperature resistant thermoplastic polymers **(see RITZENTHALER page 6375 first paragraph)**.

44. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over SOANE ET AL (US 6,570,714 B2) in view of KOPG-SILL ET AL (US 5,842,787) and DAPPRICH (US 6,585,939 B1).

45. SOANE discloses a method of molding with a dead polymer, a UV curable resin and a photo initiator as discussed in the above 102(b) rejection of claim 1, additionally SOANE discloses that the above method is an improvement over the problems with casting techniques **(see column 3 line 20 and column 4 line 15 and 36)**

46. SOANE does not appear to explicitly disclose the fabrication of microfluidic devices.

47. However, DAPPRICH discloses a method of casting wells or channels for biological fluids and/or reagents, as well as pumps and valves for directing such fluids, e.g. in a biological assay, analogous to a microfluidic device **(see abstract)**.

48. At the time of invention, it would have been *prima facie* obvious to one of ordinary skill in the art to modify the method of SOANE to include the fabrication of a biological assay of DAPPRICH, because the method of SOANE would eliminate the

problems associated with casting, such as shrinkage, and would create the same product of DAPPRICH with predictable results **(see SOANE column 4 line 15 and 36)**.

49. Additionally, SOANE does not appear to explicitly disclose that the microfluidic devices would contain internal channels with a height of typically less than 1 mm, preferably less than 0.5 mm.

50. However, KOPF-SILL discloses a microfluidic devices with channels that are about 0.01 to about 0.2 mm deep **(see column 15 line 29)** which falls within the claimed range of less than 1 mm preferable less than 0.5 mm **(see MPEP 2144.05)**.

51. At the time of invention, it would have been *prima facie* obvious to one of ordinary skill in the art to modify the method of SOANE to include the channel depth of KOPF-SILL, because specific channel depths are well known in the art and one of ordinary skill would design specific depths depending on the specific needs of the final device.

Conclusion

52. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENJAMIN SCHIFFMAN whose telephone number is (571)270-7626. The examiner can normally be reached on Monday through Thursday from 9AM until 4PM.

53. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, CHRISTINA JOHNSON can be reached on 571-272-1176. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

54. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/BENJAMIN SCHIFFMAN/
Examiner, Art Unit 4191

/Christina Johnson/
Supervisory Patent Examiner, Art Unit 1791